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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention]
This invention relates to a detail more about liquid chromatography at the connection structure of a separation column and a peripheral device.
[0002]
[Description of the Prior Art]
Liquid chromatography (it is hereafter displayed as HPLC.) is equipped with the detector which detects the liquid-sending pump which sends an eluate, the sample transfer pipet which pours in a sample, the separation column which separates the matter, and the separated matter, and between sample transfer pipet and the inlet ports of a separation column has the structure where the outlet and detector of inlet-port piping and a separation column were connected by outlet piping, respectively. HPLC separates a chemical and is widely used as a means which carries out a quantum. In addition, a sample may be directly poured into a separation column using a syringe, without using sample transfer pipet if needed.
[0003]
Generally control of temperature is [in / not only HPLC but / a chromatography] important. By making it an elevated temperature, the large theoretical plate number can be obtained, and peak resolution ability can be raised, and the viscosity of a liquid can fall, and it can process by the low pressure. This means having effect remarkable in the accuracy of measurement (correctly reproducibility) in opposition mode or ion-exchange mode especially, if the temperature under processing changes.
[0004]
For this reason, in HPLC, a separation column is usually held and used for column thermostats, such as a constant temperature bath, a warm water jacket, and a circulation air bath tub, in order to suppress the temperature change of a separation column to less than **0.1-degree-C extent. In addition, as for the convention top of JIS, it is arbitration to prepare a column thermostat.
[0005]
HPLC can be classified into three kinds of semi micro HPLC which uses the semi micro column general-purpose HPLC using the general-purpose column with which a bore exceeds 3mm, and whose bore are 1-3mm, and micro HPLC using the micro column with which a bore is less than 1mm according to the bore of the separation column to be used.
[0006]
The thing of an inside diameter according to the dimension of the separation column which inlet-port piping which connects sample transfer pipet and the inlet port of a separation column, and outlet piping which connects the outlet and detector of a separation column described above is used.

[0007]
Although these inlet-ports piping and outlet piping were formed with various ingredients, such as a resin metallurgy group which has flexibility to some extent, from inside, according to a service condition, it selects and they are used. Connection members, such as **** and a union, are used for inlet-port piping and outlet piping, and a separation column, it connects and they are fixed.
[0008]
In this case, when the separation column is held in the column thermostat as mentioned above, the posture of a separation column will be fixed out of control substantially. For this reason, when connecting a separation column and devices, such as a detector, it is necessary it not only to devise the layout of each device, but to bend inlet-port piping etc. according to the relative arrangement condition of each device, to connect with a device, or to constitute inlet-port piping etc. from two or more piping sections, and to connect each piping section by the connection member further. In addition, connecting with each device for piping is also performed, standing a separation column to a stand and changing the posture of a separation column, without using these connection methods. However, in this case, since it does not have the column thermostat, it is as having described above to include the problem on the accuracy of measurement resulting from change of a room temperature.
[0009]
In the case of general-purpose HPLC, it can select suitably from the above-mentioned connection methods, and can adopt.
[0010]
On the other hand, since the flow rate of the liquid which flows inlet-port piping and outlet piping is small to about 1 / 100 to 1/200, and the degree of pole of general-purpose HPLC in the case of micro HPLC, if a knot is prepared in piping especially in the case of outlet piping, stagnation of liquid will be produced in the knot and it will be influenced greatly at the accuracy of measurement. Moreover, inlet-port piping and outlet piping are actually difficult for adding bending actuation to piping in order to use piping of the detailed path corresponding to the dimension of a micro separation column. Moreover, if outlet piping is made [of the passage of a spiral configuration] long in the case of micro HPLC, the peak of chromatogram will serve as broadcloth and will cause the fall of the accuracy of measurement.
[0011]
By the way, when using general-purpose things, such as an extinction luminous-intensity detector and a fluorescence detector, as a detector, it is required to prepare the cel of the gestalt according to the class of detector for making light penetrate. In this case, about general-purpose HPLC, it is possible to connect outlet piping to the cel prepared in the detector. On the other hand, about micro HPLC, from a viewpoint which avoids stagnation of liquid as mentioned above, piping for connection cannot be prepared between outlet piping and a detector, or correspondence of changing outlet piping cannot be taken. For this reason, it is required to use the edge of the outlet piping 1 itself as a flow cell, as shown, for example in drawing 1 . Moreover, in micro HPLC, when using a mass spectrograph as a detector, in order to evaporate and introduce the liquid of outlet piping into the ionization chamber of a mass spectrograph, it is required to process the edge of outlet piping into nozzle dimensions.
[0012]
It is rare to be opaque generally as an ingredient of outlet piping of micro HPLC, and for the metal and resin with processing comparatively complicated again to be used by

such various reasons, and there is no knot and it is common to use one capillary tubing made from fused silica of an abbreviation straight configuration. Capillary tubing made from this fused silica is formed with high process tolerance of an optical fiber manufacturing technology, and has a uniform optical property in each part. Incidentally, the outlet piping 1 shown in drawing 1 is capillary tubing made from this fused silica, and has the structure where coating of the polyimide layer 3 was carried out to the melting silica glass tubing 2 as a protective layer. As shown in drawing 1 , in order to have attached the outlet piping 1 in the holder 4 of a detector, after exfoliating the polyimide layer 3 of the part used as a flow cell of the outlet piping 1, exposing the transparent melting silica glass tubing 2, heating the part and bending in a predetermined configuration, it attaches in a holder 4.

[0013]

In addition, about the ingredient of inlet-port piping, it is also possible to use PEEK (polyether ether ketone) resin etc.

[0014]

[Problem(s) to be Solved by the Invention]

However, although degrees of freedom, such as selection of a piping material at the time of connecting inlet-port piping and outlet piping, and each device as mentioned above and processing of piping, are large in the case of general-purpose HPLC, it is complicated to bend piping, and to connect or to use piping for connection. Moreover, when using melting silica glass as a piping material, even if there is a difference in extent, bending receives a limit.

[0015]

On the other hand, since in the case of micro HPLC there is no knot and one capillary tubing made from fused silica of an abbreviation straight configuration is used about outlet piping at least as mentioned above, in case outlet piping is connected with each device, it cannot carry out easily. For this reason, the actual condition has connected piping and each device, carrying out standing a separation column to a stand etc., and changing the posture of a separation column under a room temperature, as the effect on the accuracy of measurement by the temperature change was permitted and described above as a second best plan without holding a separation column in a column thermostat.

[0016]

This invention is made in view of the above-mentioned technical problem, and when connecting the separation column and each device by which temperature control was carried out using piping, it aims at offering the separation column attitude control device of the liquid chromatography (HPLC) which can make connection easily.

[0017]

[Means for Solving the Problem]

The separation column attitude control device of the liquid chromatography concerning this invention It has the detector which detects the liquid-sending pump which sends an eluate, the sample transfer pipet which pours in a sample, the separation column which separates the matter, and the separated matter. Between this sample transfer pipet and the inlet ports of this separation column by inlet-port piping And it sets to the liquid chromatography to which the outlet and this detector of this separation column are connected by outlet piping, respectively. the constant temperature which this separation column equipped with the heater -- it holds in the interior of a container -- having -- this -- constant temperature -- it is characterized by having the attitude control section which controls the posture of this separation column single dimension-wise thru/or in three dimensions by controlling the posture

of a container.
[0018]
moreover, the separation column attitude control device of the liquid chromatography concerning this invention -- setting -- said constant temperature -- having installation equipment furnished with a container, this attitude control section receives this installation equipment -- this -- constant temperature -- it is characterized by constituting and becoming so that the posture of a container may be controlled.
[0019]
When this connects the separation column and each device by which temperature control was carried out, connection can be easily made by changing the posture of a separation column.
[0020]
in this case, said attitude control section -- said constant temperature -- moving a fastener within a long hole, if it consists of a long hole prepared corresponding to the both sides of a container and said installation equipment, and a ruble implement which engages with this long hole -- constant temperature -- the variation rate of the container can be carried out and the effectiveness of this invention can be done so using the attitude control section of a simple and cheap configuration.
[0021]
At this time, attitude control of a single dimension thru/or the direction of three dimensions can be performed by adjusting suitably 1 set thru/or 3 sets of installation locations of a long hole and a ruble implement as a design condition. in addition, this invention -- setting -- installation equipment -- the body of equipment, and constant temperature -- a container inserts a ruble implement in the body of equipment with which the long hole was formed through the pars intermedia material in which you may have the pars intermedia material fixed directly, and the long hole was formed in this case, and fixes to it -- constant temperature -- a container is attached in the body of equipment. Moreover, a ruble implement can be suitably selected from various conclusion members, such as a bolt nut, and can be used. Moreover, in accordance with the meaning of not only the above-mentioned thing but this invention, it will be easily understood by this contractor as the attitude control section that the thing of various gestalten, such as gear structure, is employable.
[0022]
Moreover, in this case, the effectiveness of this invention can be more suitably done so as said separation column is a micro column and said outlet piping is one capillary tubing made from fused silica of the shape of an abbreviation straight without a knot.
[0023]
[Embodiment of the Invention]
The gestalt (henceforth the example of a gestalt of this operation) of suitable operation of the separation column attitude control device of the liquid chromatography concerning this invention is explained below with reference to drawing.
[0024]
First, the whole liquid chromatography (henceforth HPLC) configuration and an operation equipped with the separation column attitude control device concerning the example of a gestalt of this operation are explained with reference to drawing 2 .
[0025]
HPLC10 is equipped with a pump (liquid-sending pump) 12, the automatic sample transfer pipet (sample transfer pipet) 14, the micro column (separation column) 16, and a detector 18.
[0026]

A pump 12 is for sending the liquid (this only being hereafter called mobile phase.) which becomes an eluate, i.e., a mobile phase. For example, the amount of liquid sending is [1-3000microL/min extent and the discharge pressure of the capacity of a pump 12] 0 - 35MPa extent. The container 20 which stored the mobile phase is connected to a pump's 12 suction side for the piping 22 made from Pori 4 ****-ized ethylene.

[0027]

The automatic sample transfer pipet 14 is for pouring the prepared sample which dissolved the liquid of the measuring object in the mobile phase which is mentioned later, and by which the split was carried out into the micro column 16. The injection rate of the capacity of the automatic sample transfer pipet 14 is for example, 0.1-80microL/min extent.

[0028]

The micro column 16 is for example, Capcell Pak C18 MG 5micro (Shiseido "Capcell Pak" is a trademark), a bore is 0.5mm and die length is 150mm. The entrance side and the automatic sample transfer pipet 14 of the micro column 16 are connected for the piping 24 made from melting silica glass (inlet-port piping) shown in the conventional example. A bore is [75 micrometers and the outer diameter of piping 24] 375 micrometers. Connection (en DOFI tongs of a column) between the micro column 16 and piping 24 is made according to **** 25.

[0029]

the micro column 16 -- constant temperature -- it holds in a container (thermostat) 26 -- having -- constant temperature -- a container 26 is attached and is attached in equipment 28. constant temperature -- the structure of a container 26, and constant temperature -- about the installation structure to the installation equipment 28 of a container 26, it mentions later.

[0030]

The dimension of a case of installation equipment 28 is 46cm in 58cm long, 21cm wide, and height. It is the outlet of a mobile phase where three ports 30, 32, and 34 are established in installation equipment 28, among these the split of the port 30 was carried out to it, and a port 32 is the inlet port of the mobile phase before a split is carried out, and a port 34 is the exhaust port of the mobile phase of the surplus after carrying out a split. A port 30 and the automatic sample transfer pipet 14 are connected for the piping 36 made from PEEK whose bore is 0.065mm and whose outer diameter is 1.59mm. A port 32 and a pump 12 are connected for the piping 38 whose bore made from PEEK is 0.25mm and whose outer diameter is 1.59mm. The mobile phase of the surplus from a port 34 is processed with a proper means. Ports 30, 32, and 34 are connected to the split device 60 which attached by piping which is not illustrated, respectively and was established in equipment 28 (refer to drawing 5). The split of the mobile phase sent from the pump 12 is carried out to a precision by the split ratios 1/50 by the split device 60.

[0031]

In this case, a detector 18 is a mass spectrometer and is equipped with the detecting element 40 containing an ionization chamber. A detecting element 40 and the outlet of the micro column 16 connect for the piping 41 made from melting silica glass (outlet piping) like the case of the inlet port of the micro column 16. A bore is [75 micrometers and the outer diameter of piping 41] 375 micrometers. Connection between the micro column 16 and piping 41 is made like the case of the inlet port of the micro column 16 using **** 39.

[0032]

constant temperature -- a container 26 and constant temperature -- the installation structure to the installation equipment 28 of a container 26 is explained below.
[0033]
first, constant temperature -- the structure of a container 26 is explained with reference to drawing 3 .
[0034]
constant temperature -- a container 26 has the metal two case-for example, half objects 42a and 42b engaged by the 1 side, and constitutes the rectangular parallelepiped-like case 42 from closing the case half objects 42a and 42b. The dimension of a case 42 is 23cm in 6cm (T1) long, 6cm (Y1) wide, and height (H1). In a case 42, two block half objects 44a and 44b made from aluminum are arranged corresponding to the case half objects 42a and 42b. The block half objects 44a and 44b counter inside, and have the bridgewall sections 50a, 50b, 52a, and 52b while they counter the both ends of a longitudinal direction and have the outer wall sections 46a, 46b, 48a, and 48b, respectively. By closing the block half objects 44a and 44b, each bridgewall section 50a, and 52a, 50b and 52b contact, and the space sections A1 and A2 and A3 which were divided into three rooms in the height (H1) direction of a case 42 are formed. [each outer wall section 46a, 48a, 46b and 48b, and] The band-like heater 54 is attached in the periphery of block half object 44b.
[0035]
constant temperature -- inside the block half objects 44a and 44b which the container 26 closed, three micro columns 16 can be put side by side in parallel with the direction of width (Y1) of a case 42 by using each bridgewall section 50a, and 52a, 50b and 52b as a supporter. The micro column 16 is arranged first at the condition of having been supported by the outer wall sections 48a and 48b, and piping 24 and 41 is connected and fixed to the both ends of the micro column 16 by **** 25 and 39 after that. At this time, connection of piping 24 and 41 can be easily made by existence of the space section A1 and A3.
[0036]
constant temperature -- PID control of the container 26 is carried out to the predetermined temperature in a temperature requirement higher 5-75 degrees C than a room temperature by the control unit which is not illustrated.
[0037]
the next -- constant temperature -- the installation structure to the installation equipment 28 of a container 26 is explained with reference to drawing 4 - drawing 7 .
[0038]
Installation equipment 28 has the case 56 of the shape of a metal rectangular parallelepiped. The dimension of a case 56 is 45cm in 39cm (T2) long, 12cm (Y2) wide, and height (H2). The above mentioned split device 58 is held in the lower part of a case 56.
[0039]
constant temperature -- a container 26 is attached through a baffle plate 60, and is attached movable to equipment 28. in addition, constant temperature -- a stationary plate 61 is formed between a container 26 and a baffle plate 60.
[0040]
Have an angle-type-like configuration, for example, a baffle plate 60 is metal sheet metal. Among drawing 4 , a baffle plate 60 is arranged so that a part of top face of installation equipment 28 and one side face may be covered. the top face of the installation equipment 28 of a baffle plate 60 -- the wrap depth dimension L1 -- the inside of drawing 5 , and constant temperature -- a container 26 -- a horizontal

direction (the depth direction) -- predetermined distance -- the approach are sufficient predetermined die length to suppose that it is movable, and, as for the height dimension L2, a wrap part, on the other hand, mentions one side face of the installation equipment 28 of a baffle plate 60 later among drawing 5 -- constant temperature -- a container 26 -- the vertical direction -- predetermined distance -- it is sufficient predetermined die length to suppose that it is movable. in addition, the width method (dimension of the inside of drawing 6 , and a longitudinal direction) of the preparation plate 60 -- the form width (Y2) of the case 56 of installation equipment 28, and abbreviation -- it is formed in the same magnitude. In the top face of the installation equipment 28 of a baffle plate 60, the slit (long hole) 62 of one articles is formed in the wrap part, and the slit 64 is formed also in the top face of installation equipment 28 on the same center line as a slit 62 corresponding to this slit 62. On the other hand, the slits (long hole) 66 and 68 of two articles extended in the height direction (height dimension L 2-way) are formed in the wrap part in parallel near the both sides of the cross direction in drawing 6 in one side face of the installation equipment 28 of a baffle plate 60.

[0041]

a stationary plate 61 -- the shape of a rectangle, for example, metal sheet metal, -- it is -- the inside of drawing 6 , and a width method -- constant temperature -- it forms more greatly than horizontal Y1 dimension of a container 26 -- having -- the width method of a baffle plate 60, and abbreviation -- while being formed in the same magnitude -- a height dimension -- constant temperature -- it is formed in magnitude comparable as height H1 dimension of a container 26. Near the both sides of the cross direction in drawing 6 of a stationary plate 61, slits 66 and 68 and the slits 70 and 72 of two articles which have the unicentral line of ** are formed corresponding to the slits 66 and 68 of a baffle plate 60.

[0042]

constant temperature -- the container 26 is being fixed to the crosswise mid gear of the stationary plate 61 in drawing 6 using the conclusion member which is not illustrated. this condition -- setting -- constant temperature -- on both sides of a container 26, slits (long hole) 70 and 72 are exposed to the crosswise both sides of a stationary plate 61.

[0043]

a baffle plate 60 attaches the **** members (ruble implement) 74a and 74b in installation equipment 28 by engaging with a slit 62 and a slit 64 -- having -- on the other hand -- constant temperature -- a container 26 By engaging screw-thread member (ruble implement) 74c with a slit 66 and a slit 70, and engaging with a slit 68 and a slit 72 in 74d (ruble implement) of **** members, respectively, it attaches through a stationary plate 61 and a baffle plate 60, and is attached in equipment 28.

[0044]

constant temperature -- in the condition of having attached the container 26 and having attached in equipment 28, an example is later mentioned by adjusting the engagement location of each **** member and each slit -- as -- constant temperature -- a container 26 can be attached and can control a posture free in the direction of three dimensions to equipment 28. if it puts in another way -- constant temperature -- the micro column 16 held in the container 26 can control a posture free in the direction of three dimensions to installation equipment 28. namely, constant temperature -- each **** member and each slit which were attached in the container 26 and the installation equipment 28 grade constitute the attitude control section of this invention.

[0045]

in addition, constant temperature, when there is no need of not necessarily forming a container 26 in the direction of three dimensions movable For example, each **** member and each slit which were prepared in the top face of the installation equipment 28 of a baffle plate 60 are omitted. A baffle plate 60 can be attached using a proper conclusion member, and it can fix to equipment 28. Or it can change suitably preparing only the slit of one articles [configuration / each screw member to one side face of the installation equipment 28 of a baffle plate 60, and / of each slit] according to one screw-thread member and it etc.

[0046]

Below, two examples of the connection method of the attitude control approach of the separation column when connecting a separation column to various kinds of detectors, a detector, and a separation column are explained with reference to drawing 8 and drawing 9 .

[0047]

In the 1st example, as shown in drawing 8 , a mass spectrometer 76 is used as a detector.

[0048]

A mass spectrometer 76 is equipped with the body 78 of equipment, and a detecting element 80. The piping 41 attached in the outlet side of a separation column is connected to a detecting element 80. In addition, it is attached in the entrance side of a separation column, and piping 24 is connected to the automatic sample transfer pipet 14 as mentioned above.

[0049]

this time -- a mass spectrometer 76 -- constant temperature -- it can carry out in the posture which is easy to operate the dialing operation of piping 41 so that the die-length dimension of piping 41 may be short as much as possible and can be managed, where [which was attached and has been arranged to the opportunity side of equipment 28] a container 26 is attached -- as -- the attitude control section -- constant temperature -- the posture of a container 26 is controlled.

[0050]

namely, -- for example, the constant temperature shown in drawing 4 -- the **** members 74c and 74d are loosened from the initial state which stood straight on the base which a container 26 attaches and is not illustrated with equipment 28. and -- while moving the **** members 74c and 74d within each slit 66 and 70 and a slit 68, and 72 -- constant temperature -- a container 26 is attached and it moves to equipment 28 -- making -- constant temperature -- it positions so that it may become the posture of a request of a container 26. the last -- constant temperature -- the condition of having positioned the container 26 -- ****ing -- Members 74c and 74d -- again -- binding tight -- constant temperature -- a container 26 is attached and it fixes to equipment 28. in this case, constant temperature -- ****ing further if needed, loosening and attaching Members 74c and 74d, and adjusting a location, although the posture of a container 26 is controlled two-dimensional -- constant temperature -- the posture of a container 26 may be controlled in three dimensions.

[0051]

Next, in the 2nd example, as shown in drawing 9 , the UV analyzer 82 is used as a detector. In addition, in drawing 9 , the attitude control section etc. is omitting the display in part.

[0052]

The UV analyzer 82 is equipped with the body 84 of equipment and pump 86 which have a detecting element (not shown). The UV analyzer 82 is arranged on both sides

of installation equipment 28 at the opportunity side of a mass spectrometer 76 and the installation equipment 28 of the opposite side. the approach as the approach explained in the 1st example that the piping 41 attached in the outlet side of a separation column is the same -- constant temperature -- a counterclockwise rotation is made to rotate about 90 degrees of containers 26 from the condition of drawing 8 , and it fixes. And it is attached in the outlet side of a separation column, and piping 41 is connected to the detecting element of the body 84 of equipment.

[0053]

According to the examples 1 and 2 explained above, connection with the separation column and each device by which temperature control was carried out can be easily made by changing the posture of a separation column single dimension-wise thru/or in three dimensions using the attitude control section of a simple and cheap configuration.

[0054]

Moreover, connection can be suitably made using piping which consists of one capillary tubing made from fused silica of the shape of an abbreviation straight without a knot.

[0055]

The next is equipped with the separation column attitude control device concerning the example of a gestalt of this operation, and the example of a measurement result by ** HPLC using UV analyzer as a detector is explained to it with reference to drawing 10 .

[0056]

The Measuring condition is as follows.

[0057]

分離カラム：	Capcell Pak C18 MG 5μ (Cat.#90913)
	0.5mm i.d.×150mm
移動相：	75% acetonitrile
	500μL/min (before splitting)
検出器：	UV-Vis Detector 254nm
試料（標準試料）：	Ethylbenzene 2×10^{2}ppm
	Propylbenzene 2×10^{2}ppm
	Butylbebzene 3×10^{2}ppm
	in 30% acetonitrile 4μL inj.

When the chromatogram shown in drawing 10 is seen, it turns out that the data which were excellent in repeatability about all the three above-mentioned samples are obtained.

[Effect of the Invention]

According to the separation column attitude control device of the liquid chromatography concerning this invention It has the detector which detects the liquid-sending pump which sends an eluate, the sample transfer pipet which pours in a sample, the separation column which separates the matter, and the separated matter. Between sample transfer pipet and the inlet ports of this separation column by inlet-

port piping And it sets to the liquid chromatography to which the outlet and detector of a separation column are connected by outlet piping, respectively. the constant temperature which the separation column equipped with the heater -- it holds in the interior of a container -- having -- constant temperature -- by controlling the posture of a container In the separation column attitude control device of the liquid chromatography which has the attitude control section which controls the posture of a separation column single dimension-wise thru/or in three dimensions, and starts this invention It has installation equipment furnished with a container. constant temperature -- the attitude control section installation equipment is received -- this -- constant temperature -- since it constitutes and becomes so that the posture of a container may be controlled, when connecting the separation column and each device by which temperature control was carried out, connection can be easily made by changing the posture of a separation column.

[0058]

moreover -- according to the separation column attitude control device of the liquid chromatography concerning this invention -- the attitude control section -- constant temperature -- since it consists of a long hole prepared corresponding to the both sides of a container and installation equipment, and a ruble implement which engages with a long hole, the effectiveness of this invention can be done so using the attitude control section of a simple and cheap configuration.

[Brief Description of the Drawings]

[Drawing 1] It is drawing for explaining the condition of having connected with the extinction luminous-intensity detector etc. by using the edge of outlet piping of the separation column of micro HPLC itself as a flow cell.

[Drawing 2] It is drawing showing the outline configuration of HPLC equipped with the separation column attitude control device concerning the example of a gestalt of this operation.

[Drawing 3] the constant temperature which held the separation column of HPLC concerning the example of a gestalt of this operation -- it is the outline sectional view of a container.

[Drawing 4] It is the outline perspective view of HPLC concerning the example of a gestalt of this operation.

[Drawing 5] It is the outline side elevation which seen HPLC omits a part and is shown from arrow-head V1 direction among drawing 4 .

[Drawing 6] It is the outline side elevation which HPLC seen from the arrow-head V 2-way omits a part, and is shown among drawing 4 .

[Drawing 7] It is the outline top view which seen HPLC omits a part and is shown from arrow-head V3 direction among drawing 4 .

[Drawing 8] It is drawing showing the outline configuration of the 1st example of HPLC concerning the example of a gestalt of this operation.

[Drawing 9] It is drawing showing the outline configuration of the 2nd example of HPLC concerning the example of a gestalt of this operation.

[Drawing 10] It is the graphical representation showing the chromatogram measured and obtained using HPLC of the 2nd example.

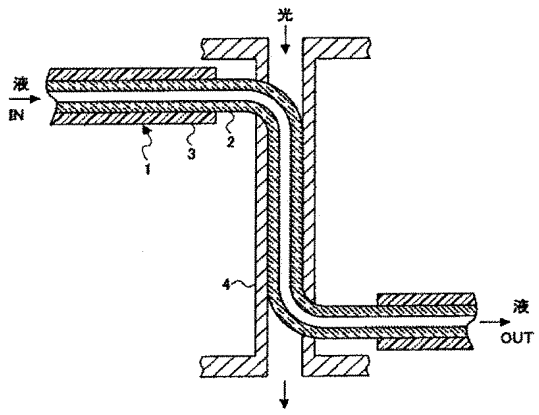
[Description of Notations]

10 HPLC
12 86 Pump
14 Automatic Sample Transfer Pipet
16 Micro Column
18 Detector

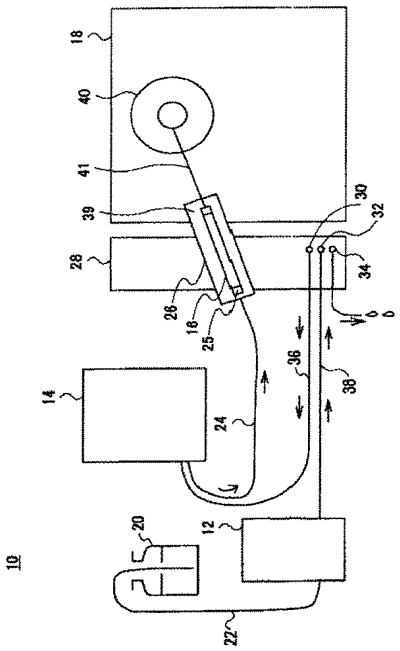
20 Container
22, 24, 36, 38, and 41 Piping
25 39 ****
26 Constant Temperature -- Container
28 Installation Equipment
40 80 Detecting element
42 56 Case
42a and 42b Case half object
44a and 44b Block half object
54 Heater
58 Split Device
60 Baffle Plate
61 Stationary Plate
62, 64, 66, 68, 70, 72 slits
74a, 74b, 74c, and 74d **** member
76 Mass Spectrometer
78 84 Body of equipment
82 UV Analyzer

[Translation done.]

[Drawing 1]



[Drawing 2]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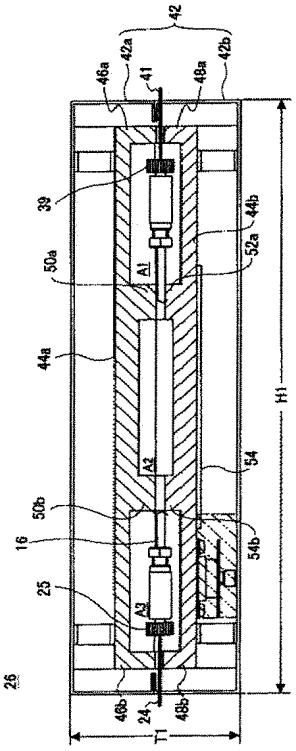
[Drawing 3]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42a
42b
44a
44b
46a
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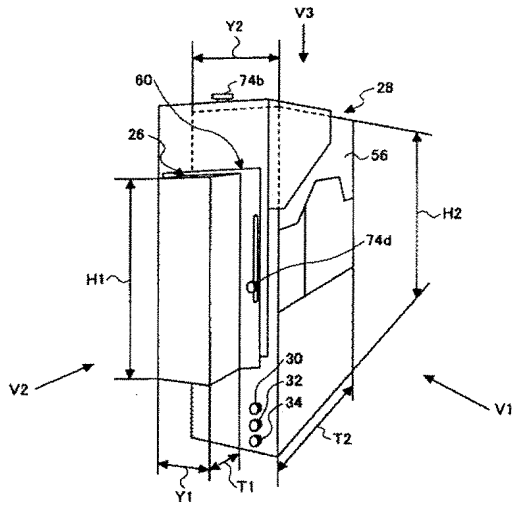
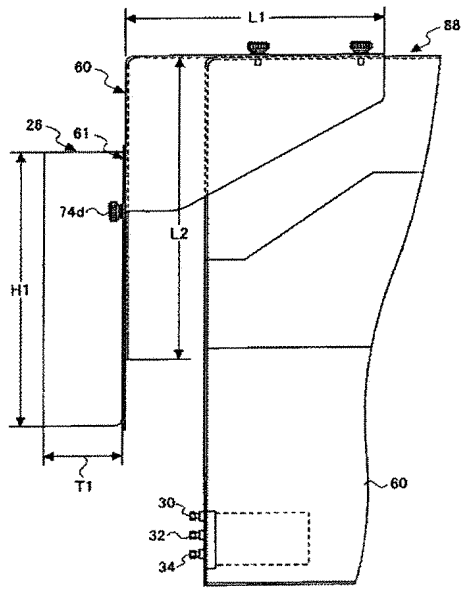
54b
A1
A2
A3
H1
T1

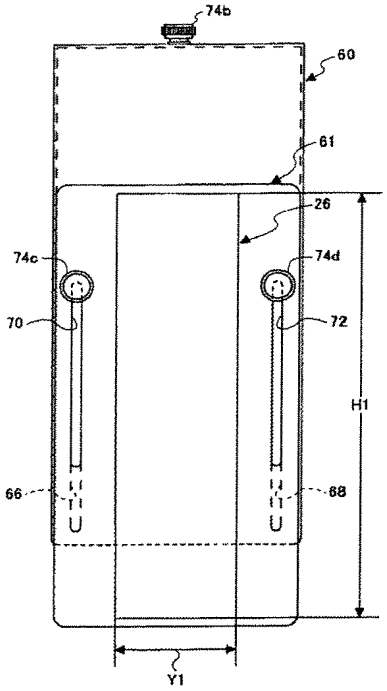
[Drawing 4]



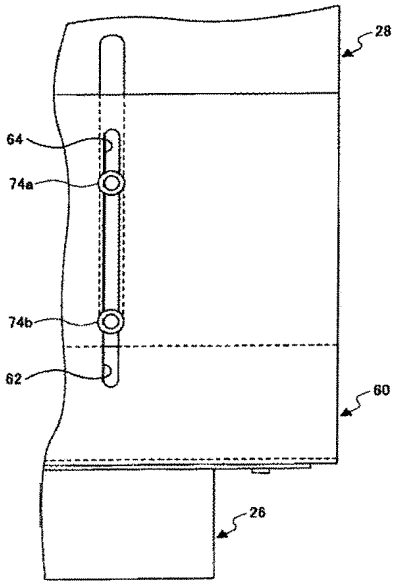
[Drawing 5]



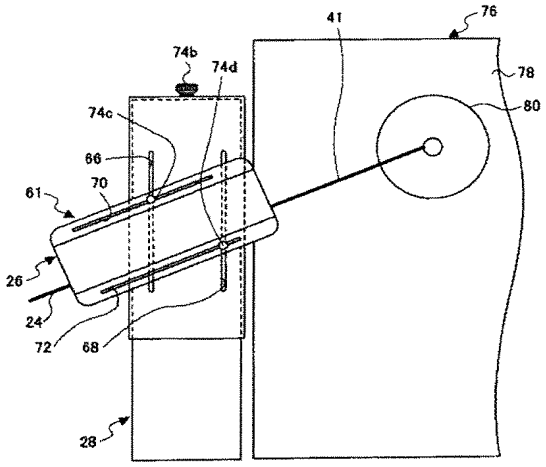
[Drawing 6]



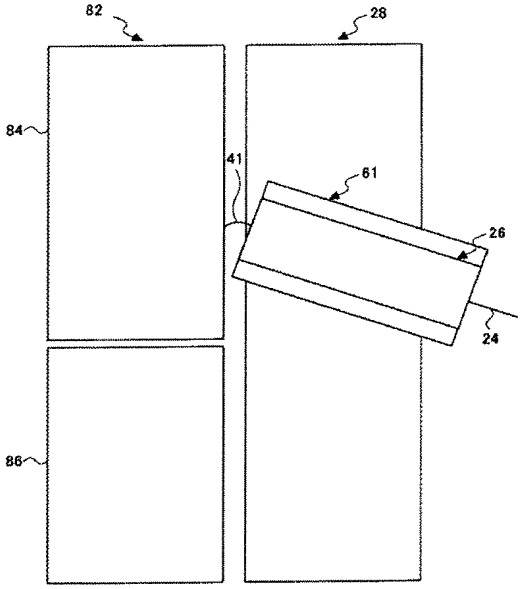
[Drawing 7]



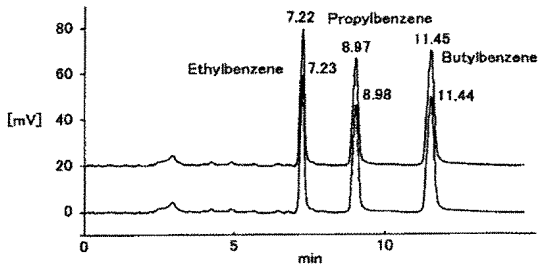
[Drawing 8]



[Drawing 9]



[Drawing 10]


7.22
Propylbenzene
11.45
8.97
Butylbenzene
Ethylbenzene
7.23
8.98
11.44
80
60
[mV] 40
20
0
0
5
10
min